

**DETAILED ACTION**

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 5 and 7-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Herron et al (2003002874) in view of Kolaczowski et al (5418204). Herron teaches a metal -oxide containing catalyst. Herron, ex 2, teaches preparation of a catalyst comprising cerium oxide as a catalyst carrier and cobalt carbonyl as catalyst particles. Herron, col. 3 line 1, teaches the carrier is preferably a porous carrier material. Although Herron teaches a catalyst comprising a carrier and particles, Herron does not teach the quantity of particles present in the catalyst. Kolaczowski teaches a catalyst support and a catalyst particle layer having a volume where the diameter ranges from 1000 to 3000 mm and a thickness ranges from .05 to 2 mm. Although Kolaczowski does not teach a specific number of atoms supported by the carrier, it would have been obvious to one of ordinary skill in the art at the time of the invention to optimize the number of atoms of a transition metal on the Herron catalyst to obtain the volume taught by Kolaczowski because Kolaczowski, col. 4 lines 52-53, teaches the thickness range of the layer

optimizes the adhesion strength of the catalyst particles to the carrier and the diameter of the layer is optimal for use in polymerization reactions.

Regarding claim 5, Herron, ex 2, teaches the carrier comprises 100% cerium oxide.

Regarding claim 7, Herron, paragraph 6 of the PGPub, teaches incorporating ruthenium into the catalyst particle layer.

Regarding claim 8, Herron, ex 2, teaches the carrier comprises cerium oxide.

Claims 2-3, 6, 10-11, 14-15, 17 and 19-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Herron et al (2003002874) in view of Kolaczowski et al (5418204) and further in view of Shibamura et al (5849658). The Kolaczowski volume incorporated into the Herron catalyst teaches a catalyst having a specific number of transition metal atoms on a catalyst carrier as discussed above. Kolaczowski, col. 4 lines 45-47, further teaches a minimum thickness of catalyst layer would be equivalent to a molecular monolayer of the catalyst but neither Herron nor Kolaczowski teach the particles in an oxidizing atmosphere. Shibamura teaches a catalyst comprising partially fluorinated chromium oxide. Shibamura, col. 2 lines 49-50, teaches the catalyst may be activated with an oxygen containing gas such as air. It would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the Shibamura step

into the Herron modified by the Kolaczowski volume catalyst because Shibamura teaches this step activates the catalyst which results in an increased catalytic activity compared to conventional catalysts.

Regarding claim 3, Herron, paragraph 28 of the PGPub, further teaches incorporating lanthanum in the form of an oxide with the catalyst particles. Exposing the catalyst particles to an oxidizing atmosphere results in the formation of a complex oxide of a rare earth element.

Regarding claims 6, 14-15, 17 and 19-20, Shibamura, col. 3 lines 43-45, teaches a specific surface area of 170 m<sup>2</sup>/g to 300 m<sup>2</sup>/g.

Regarding claims 10-11, Herron, ex 2, teaches the carrier comprises 100% cerium oxide.

Claims 4, 9, 12-13, 16 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Herron (2003002874) in view of Kolaczowski (5418204) in view of Shibamura et al (5849658) and further in view of Gupta et al (4554291). The Kolaczowski volume incorporated into the Herron catalyst teaches a catalyst having a specific number of atoms of a transition metal as discussed above. Shibamura, col. 3 lines 33-35, further teaches a catalyst comprising partially fluorinated chromium oxide where a chromium hydroxide powder is sintered in a stream of nitrogen to obtain

amorphous chromium oxide but Herron, Kolaczowski and Shibnuma do not teach a particle size of the transition metal particles or reducing of the catalyst. Gupta, col. 5 line 7, teaches a catalyst comprising a catalyst layer where spherical particles range in size from 6 nm to 60 nm. It would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the Gupta particle size in with the Herron modified by the Kolaczowski volume catalyst because Gupta, col. 3 lines 1-2, teaches the catalyst maintains its catalytic activity and high selectivity of C2-C6 alkenes over a relatively long period of time.

Regarding claim 9, Gupta, col. 5 line 7, teaches a catalyst comprising a catalyst layer where spherical particles range in size from 6 nm to 60 nm.

Regarding claims 12-13, Herron, ex 2, teaches the carrier comprises 100% cerium oxide.

Regarding claims 16 and 18, Shibnuma, col. 3 lines 43-45, teaches a specific surface are of 170 m<sup>2</sup>/g to 300 m<sup>2</sup>/g.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to STEFANIE COHEN whose telephone number is (571)270-5836. The examiner can normally be reached on Monday through Thursday 8:00am-4:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jenny McNeil can be reached on 5712721540. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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